Introduced Rats and Island Ecosystems

There are three species of rats in the genus *Rattus* which are commensal with humans and have been introduced to islands throughout the world. In order of decreasing size they are: the Norway or brown rats *R. norvegicus*, the ship or black rat *R. rattus*, and the Pacific or Polynesian rat *R. exulans*. They have different dietary preferences, distributions and histories of introduction, but all three species are omnivorous, behaviorally plastic, have high reproductive rates, and can survive in a variety of habitats. These traits make them ideally suited to survive on a variety of predator free islands. At least one of the three species occurs on an estimated 82% of all island groups worldwide, with *R. rattus* being the most common introduced rat. The black rat is found on Anacapa Island.

The most obvious impacts of introduced rats on island ecosystems are extinctions. Introduced rats (*Rattus* spp) are responsible for an estimated 40 - 60% of all bird and reptile extinctions. They have caused extinctions of endemic mammals and invertebrates on the Galapagos and elsewhere.

Even if extinctions do not occur, rats can have ecosystem wide effects on the distribution and abundance of native species through direct and indirect effects. For example, comparisons of rat-infested and rat-free islands, or pre and post rat eradication experiments, have shown that rats depressed the population size and recruitment of birds, reptiles, plants and terrestrial invertebrates. Rats have also been shown to affect the abundance and age structure of intertidal invertebrates.

Each of the three species of commensal *Rattus* have been implicated in extinctions and prey populations changes. Due to their different natural histories, however, each species has slightly different impacts. For example *R. norvegicus* tends to have a greater impact on adult burrow nesting seabirds than does *R. rattus*, but less of an impact on tree nesting birds. Consequently, the introduction of new *Rattus* species should be avoided, even to islands which already have introduced rats.